32456

RS-50

PRELIMINARY OPERATING INSTRUCTIONS

FOR

FRONT PANEL CONTROLS

TEXSCAN

S/N 2934

SPECIFICATIONS

FREQUENCY RANGE	The RS-50 can be centered at any frequency between 2 MHz and 500 MHz and sweep anywhere within that range.
FREQUENCY DIAL ACCURACY	The dial accuracy on all three indicators, F1-F2 and Variable Fo are within ±2% of the units maximum frequency.
Except in ΔF mode:	ΔF provides a calibrated sweep width within 6% of the units maximum frequency.
SWEEP WIDTH	F1-F2 - Sweep width adjustable from minimum of 2 MHz to maximum sweep width of 500 MHz. ΔF/Fo - minimum sweep width as limited by residual FM is approximately 100 KHz.
RF OUTPUT	The RF output is at least 1 volt rms into a 50 ohm load.
FLATNESS	The flatness is better than ±0.25 db at maximum sweep width (tested with a CD-51 detector)
HARMONIC DISTORTION AND SPURIOUS	At 1.0V rms output and from 5 MHz to 500 MHz, all unwanted frequency components are more than 30 db below the fundamental output.
LINEARITY	Linearity is accurate to within ±1% of the units maximum frequency.

MARKERS: Birdy Markers - The unit has a birdy bypass marker system with provisions for up to six single frequency or harmonic markers. An external marker input is provided which can be used with a CW source to produce a variable marker. A 100 mv signal produces a marker greater than 1 volt peak to peak. The marker can be rectified for x-y recordings.

Pulse Markers - F3 and F4 are uncalibrated pulse markers which indicate the portion of the sweep for dual sweep width operation. A calibrated variable pulse marker is also provided.

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FRONT PANEL CONTROLS

TURNING CONTROLS

F_1 and F_2 are used to vary that start and stop frequencies of the swept output. A slide rule dial with indicators is used to provide exceptional resolution.

In the F_1-F_2 start/stop position of the tuning mode control, a pulse marker is present and is used as a calibrated variable marker. In the F mode, F_1- F becomes a calibrated sweep width or ΔF control and the variable marker becomes a calibrated center frequency control, Fo. In the .1ΔF the calibrated sweep width scale is divided by ten or a maximum sweep width of 50 MHz.

Calibration accuracy of the indicators is $\pm$2% of the units maximum frequency.

RF Level Control - This control is used to provide vernier control of RF output over a 10 db range.

RF Attenuators - Two rotary attenuators are provided at the RF output of the generator. These two rotary attenuators can be used to vary the output level by 70 db with a resolution of 1 db.

Sweep Interval Control - This function switch is used to select among four different modes of sweept output.

1. F1-F2 mode is a normal start-stop sweep mode.
2. F1-F2 with markers - This mode provides the same swept output as F1-F2 mode with the addition of two pulse markers identified as F3 and F4. The amplitude of these markers can be varied with a front panel control. The position of these markers can be varied by adjusting the F3 and F4 frequency controls.
3. F3-F4 mode - In this mode, the sweep generator will sweep as if F3 and F4 were the start and stop frequencies.
4. F1-F2/F3-F4 - The sweep generator on alternate cycles of swept output sweeps from F1 to F2 and then from F3 and F4 providing a dual trace presentation which can be used to expand certain areas for careful examination of test circuit characteristics.

The potentiometers control is used to vary pulse marker amplitude.

Dual Rate Control - This push-button switch, which operates in all, but F1-F2/F3-F4 mode, activates a special feature which allows the user to conveniently set sweep rate at the highest possible value while still obtaining an undistorted bandpass presentation. When this circuit is energized, on alternate cycles of the swept output, the sweep speed is varied resulting in two displaced presentations if the circuit response is too slow for the sweep rate setting.

Sweep Rate Control - This switch and potentiometer combination provides control of the rate at which the swept output is varied. Sweep times from 0.01 to 100 seconds are provided with the potentiometer providing a continuously variable adjustment at each range setting. In the manual sweep rate mode, this same control can be used to manually sweep the unit for careful investigation of certain portions of the test circuit's characteristic curve.

1 KHz Modulation - This push-button control, when energized, amplitude modulates the RF output at a 1 KHz rate. Square wave modulation is provided with modulation depth extending to complete turn off.

Sweep Mode Control - This control is used to switch the internal sweep generator time base among one of six different modes of operation.

1. Single Sweep Mode - In this switch position, the internal time base generator will sweep over one cycle when energized, thereby, providing a convenient means of obtaining an x-y display. The speed at which this one cycle will be completed is determined by the sweep rate control.
2. Triggered Sweep - In this mode, the time base generator can be triggered from an external source.
3. Automatic - Automatic is the normal sweep generator mode of operation with the sweep rate control switch and potentiometer combination controlling the rate of swept RF output.
4. Line Rate Mode - In this position, the sweep generator output will vary at 50/60 Hz line rate frequency.
5. Manual Position - In this mode, the internal pot in the sweep rate control can be used to manually sweep the output.
6. CW Mode - In this mode of operation, RF blanking during retrace time is deactivated and the generator operates as a CW signal generator with Fo controlling the output frequency. Tuning mode must be in ΔF or $.1\Delta F$.

Single Sweep Trigger - With the sweep mode switch in its single sweep position, this push button starts one cycle of the internal time base generator resulting in one cycle of swept RF output over the frequency range selected with the sweep interval and frequency controls.

Trigger Level and Power On-Off Switch - This control is used to turn on the AC power to the unit and also select the trigger level when the sweep mode switch is set for triggered sweep. The slide switches allow selection of + or - trigger slopes on either AC or DC triggering when in the triggered sweep mode.

RF Output Connector - The swept or CW output from the generator is available at this terminal.

External ALC Control - This switch can be used to convert from internal leveling to external monitor operation. When testing circuits distant from the generator, an external monitor can be used to level the instrument

at the input to the device under test. The switch provides selection of this external mode of operation or the normal internal leveling circuitry provided with the instrument. If no external monitor is employed, this switch can be used to deactivate the internal automatic leveling circuitry.

RF Level Blanking Off - When activated, the swept RF output is no longer blanked during retrace. If a zero level retrace line is desired in this mode, video blanking is provided and can be turned on or off with an internal slide switch. This provides the necessary reference base line and also eliminates possible transients which could result from switching the RF output.

Logarithmic Amplifier Selection Switch - The output from the test device can be detected and logarithmically amplitifed within the sweep generator. This switch is used to select detection, or detection and logarithmic amplification. It also connects the amplifier or detector output to the vertical oscilloscope connector.

Detector Input Connector - The RF output from the circuit under test is inserted at this connector if the internal detector is to be used.

Video Input Connector - If an external detector is employed and it is desired to add markers to the detected output, then the detectored signal is inserted at this connector. The external detector switch must be activated.

Vertical Output Connector - This connector provides the vertical input to the x-y display oscilloscope used in most test systems.

Horizontal Output Connector - A triangular wave form of approximately 10 volts peak to peak is provided at this connector for oscilloscope horizontal drive.

Trigger Input Connector - If the sweep generator is being triggered from an external voltage source, that source should be connected to this terminal.

F3-F4 Frequency Controls - These two controls are used to vary the position of the F3 and F4 pulse markers on the detected output display while operating in either the F1-F2 with markers or F1-F2/F3-F4 modes of operation.

Marker Size Control - One control is provided to vary the amplitude of internal birdy markers. Up to six internal harmonic or single frequency markers can be supplied and this control adjusts the amplitude of the output of all of these six markers if energized. The external marker control varies the amplitude of the birdy marker which results if an external generator is connected to the external marker input terminal.

External Marker Connector - If an external signal generator is used as a marker generator to identify frequency, it is insterted at this connector.

Marker Switch Control - Six switches are provided, each one of which energizes an internal plug-in marker socket. Up to six markers can be selected.

Horizontal Marker Switch - This switch can be used to convert the birdy marker presentation from vertical to horizontal markers for more convenient frequency identification of sharp skirts.

Rectified Birdy Marker Switch - When an x-y recorder is used to display the test circuit characteristics and marker identification is desired on this recorded output, the normal birdy presentation is averaged by the recorder thereby losing the markers. This switch, if energized, rectifies the birdy markers resulting in clear identification of frequency when using this x-y recorder method of presentation.

CIRCUIT DESCRIPTION

The heart of the RS Series sweep signal generator is the rate circuit. This circuit provides all of the voltage waveforms necessary to operate all the functions of the unit except the RF circuitry.

This circuit has six modes of operation as determined by the sweep mode control. The modes are: cw, manual, line, auto, trigger, and single sweep. The six modes are achieved by changing the operating characteristics of the basic rate circuit consisting of a Schmidt Trigger and Miller Integrator.

Transistors Q109 and Q110 are incorporated in the Schmidt Trigger, and Q112, Q113, and Q114 are used in the Miller Integrator. This combination of a Schmidt Trigger and Miller Integrator provides square wave and triangular wave outputs with a fixed phase relationship. The square wave is present at the collector of Q110; the triangular wave, at the emitter of Q114. The circuit provides these signals with constant amplitude over the frequency range of the rate circuit.

In the auto position, the rate circuit is adjustable over four decade frequency bands as determined by the position of the sweep rate switch. The rate circuit will sweep from 100 seconds per sweep to 100 sweeps per second.

Capacitors C114 and C120, C115, C116, and C117 make up the capacity part of the time constant for the four sweep rates. Two ganged variable resistors consisting of R803C and R803B provide the vernier frequency range over each sweep rate decade.

In the line position, a 60 Hz signal from the power transformer is coupled through C103 and C104 to the base of Q109. The circuit locks the rate generator to the line frequency. The other poles of the switch convert the circuit time constants, etc, to insure the locking and provide the same amplitude as in the auto mode.

In the manual mode of operation, the rate circuit is bypassed and a DC voltage is provided at the output of the rate circuit. R803A section of the rate circuit vernier provides adjustment of this DC voltage through the same amplitude swing normally available from the rate circuit.

In the cw position, the entire rate circuit and start-stop circuitry is disabled leaving only the linearity circuit in operation to determine the cw output frequency. When the unit is switched from start/stop mode to the conventional Fo/ΔF mode, the variable-marker pot is switched to the linearity circuit and provides an adjustable DC level which tunes the sweeper through the frequency range as indicated by the pointer associated with the Variable-Marker - Fo control.

In the trigger position, the sweep mode switche connects the necessary circuitry to inhibit the rate circuit in such a way that the blanking is in the off state and no triangular waveform is being generated. The rate circuit is inhibited by Q107 which is a hold off gate. An external trigger signal is fed to a voltage comparator, Q101 and Q102. The trigger level control sets the proper input waveform level at the collector of Q102 to cause the Schmidt Trigger, Q103 and Q104 to generate a pulse. This pulse is shaped and coupled to the hold off circuitry consisting of another Schmidt Trigger, Q105 and Q106, and the hold off gate, Q107. R105 established a negative bias on the base of Q105 which in turn holds the rate circuit off. When a positive going pulse of sufficient amplitude to overcome the negative bias is created by an external signal, the Schmidt Trigger, Q105 and Q106 turns off the hold off gate and allows the rate circuit to start integrating upward in voltage. When the integrator output reaches a certain level, the Schmidt Trigger, Q109 and Q110 changes state and the integrator which starts integrating back down, but a negative going pulse is generated which turns the hold off circuit back on, and the integrator will integrate back down and the entire unit returns to its pre-triggered condition.

In single sweep, the trigger circuit functions exactly the same except when the single sweep button is pushed, a positive voltage is momentarilly applied to the base of Q103 which actuates the trigger sequence.

START-STOP ANDER

The output from Q114 of the rate circuit is coupled to a paraphase amplifier, Q108. This transistor provides two outputs: the emitter waveform being exactly the same as the input and the collector waveform is an inverted waveform of approximately the same amplitude and at a different DC level. Two internal controls, R202 and R208 are used to set the upper most peak of both the regular and inverted waveform to the same DC level as appears at the junction of R221 and R222. One side of F_1 and F_2 are tied to this

junction, a voltage which is the same as the peak of the regular and inverted waveform, plus the amplitude of the waveforms are made equal by adjusting R204 and R209, and applied to the other end of F_1 and F_2 pot, then through two resistor adders, R229 and R230 at the junction (gate of Q204) appears a waveform where F_1 will vary only one peak and F_2, the other peak. This is the start/stop signal which when amplified by Q204 is coupled to the oscillator, provides independent adjustment of the end frequencies of the swept signal.

DUAL SWEEP WIDTH

At the wipers of R202 and R208 is an exact duplicate of the F_1-F_2 start/stop adder circuit except F_3 and F_4 controls are in this circuit. The other adder consisting of R236 and R237 (gate of Q205) (when the amplitudes have been properly set by R205 and R210) is a start/stop signal which also sets the ends of the swept signal. When the sweep interval switch is placed in F_1-F_2/F_3-F_4, the sweep generator sweeps between F_1 and F_2 and then during the next blanking period, sweeps between F_3 and F_4. This is accomplished by alternately connecting the two adder outputs (drains of Q204 and Q205) to the oscillator via the linearity circuit. The blanking signal is fed to a counter flip-flop which divides the blanking frequency by two and provides the switching signal for the dual sweep width operation.

When the unit is switched from start/stop to the conventional Fo- F mode, the F_1 and F_2 controls are removed from the adder circuit and replaced by two pots, R813 and R814 which have been set to give the same amplitude signal out of the adder as would be provided if the F_1 and F2 controls were set for maximum sweep width. F_3 and F_4 still function as normal except the F_3-F_4 maximum frequency is limited by the setting F_1. In this mode of operation, the F_1 control now becomes a calibrated ΔF or sweep width.

LINEARITY

An emitter follower using Q701 is the coupling stage between the start/stop adder output circuit and the linearity circuit. The emitter follower output is coupled through R717, R719, and R724 which are used to set the amplitude and DC level of the triangular waveform for proper operation in both start/stop and conventional operation. The waveform is amplified by a differential amplifier, Q702 and Q703, and present at each collector is a waveform of

sufficient amplitude and 180° phase difference to sweep the oscillators in the proper manner.

The diode break circuitry consisting of CR701, CR702, CR703, CR704, CR705, and CR706 distorts the drive signals at the collectors of the differential amplifier. This circuit is piece wise linear. For example, for any assumed combination of forward and back biased diodes, the circuit has a linear characteristic. As the voltages at the collectors of these two transistors increase, these diodes sequencially conduct and the resultant waveform is distorted. The shape of this waveform can be adjusted with the potentiometers included in the circuit. These two, 180° out of phase, distorted, drive voltages are coupled to the varactors in the two sweep oscillators. In the start/stop mode, R725 establishes the center frequency of the sweep. In the ΔF mode, R817 is the adjustable calibrated front panel control that tunes center frequency.

PULSE MARKERS

The pulse markers are derived from the triangular waveform out of the start/stop adder. The triangular waveform is coupled into one side of a voltage comparator, Q601A. A DC level is coupled into the other side of the comparator, Q601B, from a front panel control. The DC voltage sets the level of the triangular waveform at the collector of Q601A. Connected to this collector is a Schmidt Trigger, Q603 and Q604 which changes state as the triangular waveform present at the collector goes more positive thru a certain value which is the trigger point of the Schmidt Trigger. The output of the Schmidt Trigger is differentiated to give a sharp pulse and fed through a diode adder to a pulse amplifier, Q645. The variable marker, and F_4 are also generated in identical circuits as described above with the variable markers coupled to Q645 all the time, but F_3 and F_4 are connected only when the sweep interval control is in the F_1-F_2 markers and F_1-F_2/F_3-F_4 position. The Schmidt Trigger hystersis is such that at narrow start/stop sweep width settings, the triangular waveform may not be sufficient to turn the Schmidt Trigger on and off. The blanking voltage is coupled to the voltage comparators of the three pulse circuits to switch the collector voltage over a large range to insure resetting the Schmidt Trigger. If the F_1-F_2 controls are reversed such that F_2 is the lower frequency, and the unit sweeps backward, no pulses will be present.

CHECK OUT PROCEDURE

The RS Series should be checked out board by board. After one board is operating properly, and difficulty is encountered with the next board, a checked out board should be inserted in the trouble spot. If this board operates properly, then the trouble is in the harness and should be located before continuing with the new board. Be sure the board contact pins are clean and bright.

Initial Check Out

With a bare chassis except for birdy amplifier and rf boxes, insert a power supply board. With an ohm meter, check across the power plug to be sure on/off switch and 115/230 switch are correctly wired. In the 115V position, about 15 ohm, and 230V - about 60 ohms should be read on the ohm meter.

Connect the power cord to a Variac, and slowly bring the voltage up while alternately monitoring the +30, -30, and 110V supplies. All the supplies should begin to clamp at some voltage around 95-100V AC input. Proceed to 115V AC and then adjust the supplies for their respective voltages. Then check the supplies for ripple which shouldn't be more than 10 mv.

CAUTION: Do not unplug or insert boards with power turned on.

Rate Circuit

Insert the rate circuit board, B208-051 in Row 5, and set the front panel controls as follows:

Sweep rate 10-100
Sweep rate vernier fully clockwise
Sweep mode - auto

With a scope probe connected to 5BD or the base of Q108, adjust R133 (upper trigger point) and R145 (lower trigger point) for a triangular waveform of 2V to 20V. If the rate circuit does not free run (no triangular waveform), adjust R108 (auto-line) until it appears, then advance R108 1/4 turn more. Check all 4 positions of rate for proper operation. Check for triangular waveforms at 5BD and 5BE. Check 5BA for -12V DC, and with scope at 5BB, adjust R153 (horizontal DC centering) for a symetrical waveform about zero volts. After 5 or 10 minute warm-up, set sweep mode to line and adjust R111 and R165 for a triangular waveform of exactly the same amplitude and DC level as occurred in the auto position.

Set the sweep mode switch to single sweep while observing 5BD. The

triangular waveform should not be present. If it is, adjust R105 until it quits and press single sweep button. One sweep should occur and then reset to its original level.

Next switch to trigger and feed the output of the Heath square wave generator into the trigger input plug. The trigger circuit should operate or require minor adjustment of R105.

Switch to manual and see if the DC level on 5BD changes. When the manual pot is turned, R159 and R161 will be set to travel the same range as the sinle sweep when it is actuated.

Dual Rate Board

Turn unit off and insert B208-050 - dual rate adder board in Row 4.

Set controls same as with rate board.

Plus: Set F1 against the left stop.
Set F2 against the right stop.
Set tuning mode in F1-F2 position.
Set sweep interval to F1-F2 position.
Set F3 fully counter-clockwise.
Set F4 fully clockwise.

Connect a scope to 4AS or junction of R221 and R222. This should be approximately minus 2 Volts. Next sit the upper point of the triangular waveforms on the wipers of R208 and R202 exactly 0.25 volts more positive than 4AS. Now connect scope to 4BH (junction of the drains of Q204 and Q205, and adjust R209 (F1, sweep width) and R213 to obtain a triangular waveform of 2.5 to 22 V.

Now turn F2 until the pointer is exactly over the pointer for F1 while still monitoring 4BH. Set the scope on AC and increase gain of scope. Now adjust R204 until the triangular waveform has been nulled out - straight line. Check for proper start/stop waveform.

Check the collector of Q206 and Q207 for a square wave of half the frequency of the blanking. Blanking of about 0 - 25 V should be on 4AT and 4AP. Set the sweep interval to F1-F2/F3-F4 and check the source terminal of both Q204 and Q205 for the half frequency square wave of 25 volts. The two square waves should be out of phase one positive when other negative. Set sweep interval to F3-F4 and monitor 4BH. Adjust R216 and R210 (F3, sweep width) for a 2.5V to 22V triangular waveform. It is important that the triangular waveform for F3-F4 be exactly equal to F1-F2 in amplitude and DC level. This can be easily determined later with the markers in the unit. Turn F4 fully counter-clockwise and adjust R205 for a null or straight line as with F2 in earlier step. A slight readjustment may be required as part of the final set up. Switch tuning mode to F mode and set the level of the triangular waveform at 4BH to the same level and phase with the two small pots on the dial drive.

While monitoring 4BH, push the dual rate button. A triangular waveform with alternate longer periods should be observed. If not, check Q203 assuming the flip-flop is switching properly. Dual rate works in all, but the F1-F2/F3-F4 setting of the sweep interval control and line rate.

Set the rate switch to the two slowest settings: .01 to .1 and .1 - 1, check with a Simpson on the back panel pen lift connector for the reed relay to open and close. S202 determines whether the center pin of the BNC is grounded during trace or blanking time.

Video blanking Q211 should be checked later after a signal is fed into the detector. Set S201 to the off position, slide toward top of board - no video blanking. It is virtually impossible to set up the log amplifier with the video blanking on.

Leveler - Log Amp Board

Set sweep interval to F1-F2.
Set sweep mode to auto - about normal viewing rate.
Connect RF output to interval detector.
Install B208-047 - Leveler - Log Amp boarding in Row 6.

Turn on unit. A box pattern should be seen on scope. Check RF level on front panel for proper range (10 db) and set level minimum and level maximum pots on back panel to obtain this range. Set output at 1 Volt RMS. Push RF button (blanking) and the base line should vanish if video blanking is turned off. Check external monitor or ALC by pushing external ALC button and the output should increase. With the output at 1 volt, turn on the log amp (FP) and adjust offset if needed; R482 to bring pattern to center of screen. Make sure R492 (size) is not turned to wrong end and no output present. Adjust balance R479 to obtain the desired 40 - 50 db range. Adjust offset for a zero DC level baseline, and adjust size so that the box pattern is the same amplitude for log amp or detector only. Now while monitoring collector of Q458 or 459, push the 1 KHz button and adjust R468 and R469 for best stable 1 KHz square wave. Check the RF output to see that the output is being modulated at this rate. Check rear panel for blanking out and feed in on AM input for modulation from an audio generator.

Linearity Board

Plug in linearity board in Row 7, B208-052. Set F1-F2 against their respective stops.

Sweep interval - F1-F2.
Sweep mode - auto and reasonable viewing rate.
Install marker - HM-50.

Turn on unit and set the wiper of R71 to give a triangular wave-

form symetrical around Zero V. The input should be 2.5 to 22V. Set the tuning mode to F_1-F_2 and by adjusting R724 and R723 (drive size) the output should be swept and birdy markers present. If not, check for varactor drive voltage on the proper feed-thru in the oscillator. If it is present, check the birdy amp board and sweep sample. After proper markers have been established, adjust R724 to have a 1.8V peak waveform and R719 to have a 2.2V peak waveform on their respective wipers. Adjust R725 to center 250 MHz on screen. Now adjust the drive size to set the 200, 250, 300 MHz markers on the 3 center gradicules. Now set the rest of the pots in the diode shaper until a 1% linearity is obtained. With a calibrated scale, set F_1 at zero and F_2 at 500 MHz. Adjust R724 and R725 until 0 falls on the left edge and 500 MHz falls on right edge of the box pattern. Now with the scale, check calibration of F_2 as it is turned toward F_1 and also F_1 toward F_2. Set F_1 to 100 MHz and R738 and 730 will be set by switching tuning mode to Fo/ F. Set blue pointer (Fo) at zero and adjust R738 until zero center frequency appears. Set Fo at 500 MHz and adjust R730 until 500 MHz appears in center. This will require repeat adjustment due to interaction of controls. Set Fo at 250 MHz and F_1 at 500 MHz, adjust R719 for 0 to 500 MHz sweep. Fed in a 60 cycle signal on the gate of Q704 or 7 BR Lock/FM input and watch for markers to wobble back and forth. If they do, then the external phase lock and FM input works.

Pulse Marker Board

Install board B208-049 in Row 3. Set controls as follows:

Tuning mode - F_1-F_2.
Sweep interval - F_1-F_2 markers.
Sweep mode - auto.
F1 and F_2 against their stops.
F3 and F4 near midrange.
Variable marker - 250 MHz.
Pulse marker size - fully clockwise.

When turned on, three pulses should be present on the trace. If not, adjust F_3, F_4, and variable marker until they are. S641 determines the polarity of the pulse. The unit will be shipped with positive going pulses. The variable marker pulse is approximately 15% smaller in amplitude. Each pulse has 2 internal pots which determine the range of the pulse. F_3, low, R614, sets the position of the pulse on the left end of the sweep with F_3 (FP) set fully counter-clockwise and F_3 high, R616 sets the position of the pulse on the high end or right end of the trace. The same applies for the corresponding set of pots for F_4 and variable marker. The variable marker and F_3 and F_4 should be checked and set so they will travel the full range.

Set the variable marker pointer (blue) on zero frequency on the scale and adjust R655 until the pulse overlaps zero. Run pointer to 500 MHz and adjust R656 until pulse overlaps 500 MHz birdy. Repeat this adjustment until calibration tracks.

F3 and F4 pulses will be set as part of the final setup.

Final setup, allow 15 minutes warmup.

Set sweep interval - F1-F2/F3-F4.
F1 and F2 against their stops.
F3 fully counter-clockwise.
F4 fully clockwise.

The dual trace pattern presentation must overlap so that each birdy and the zero lie exactly on top of each other. Some readjustment of adder circuitry may be needed to achieve this requirement. To set F3 and F4, switch sweep interval to F3-F4 and decrease sweep width with F3 and F4 around the 50 MHz marker until as narrow as possible and still see a birdy. Now switch sweep interval to F1-F2 markers and adjust F3, low (R614), and F4, low (R634), until both pulses line up over the 50 MHz birdy. Switch sweep interval back to F3-F4 and now decrease the sweep width around 450 MHz birdy with F3 and F4. Switch back to F1-F2 markers and adjust F3, high (R615), and F4, high (R635), until the pulses line up over the 450 MHz markers. Repeat the setup for F3 and F4 due to interaction of the internal pots. Now set sweep interval to F1-F2 markers and position the markers around zero, and switch to F3-F4, and see if the portion between the pulse markers is displayed. Repeat for every 50 MHz birdy marker. The accuracy is $\pm 3\%$ or each marker could be off as much as ± 30 MHz.

Push marker clip and see if the birdy marker is clipped off. Look at the horizontal waveform and push tilt button, birdy markers should be present on the horizontal triangular waveform.

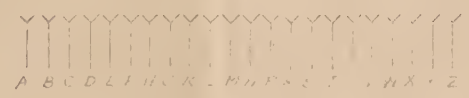
Double-check:

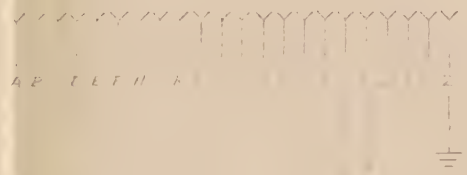
Sweep mode - line and auto box pattern exactly same size.
Manual sweep travels same range as single sweep.

Check video blanking.

FRONT VIEW

A SOCKET





HOLE SCHEDULE		
HOLE	DESCRIPTION	QTY.

See Sheet 2
See Sheet

REVISION	DESCRIPTION	DATE

MAT'L:

FINISH:

SPECIFICATIONS
DECIMAL DIMENSIONS TO BE ± .005
FRACTIONAL DIMENSIONS TO BE ± 1/64
DRILL, PUNCH, AND COMMERCIAL STOCK SIZES DO NOT APPLY

DO NOT SCALE THIS PRINT

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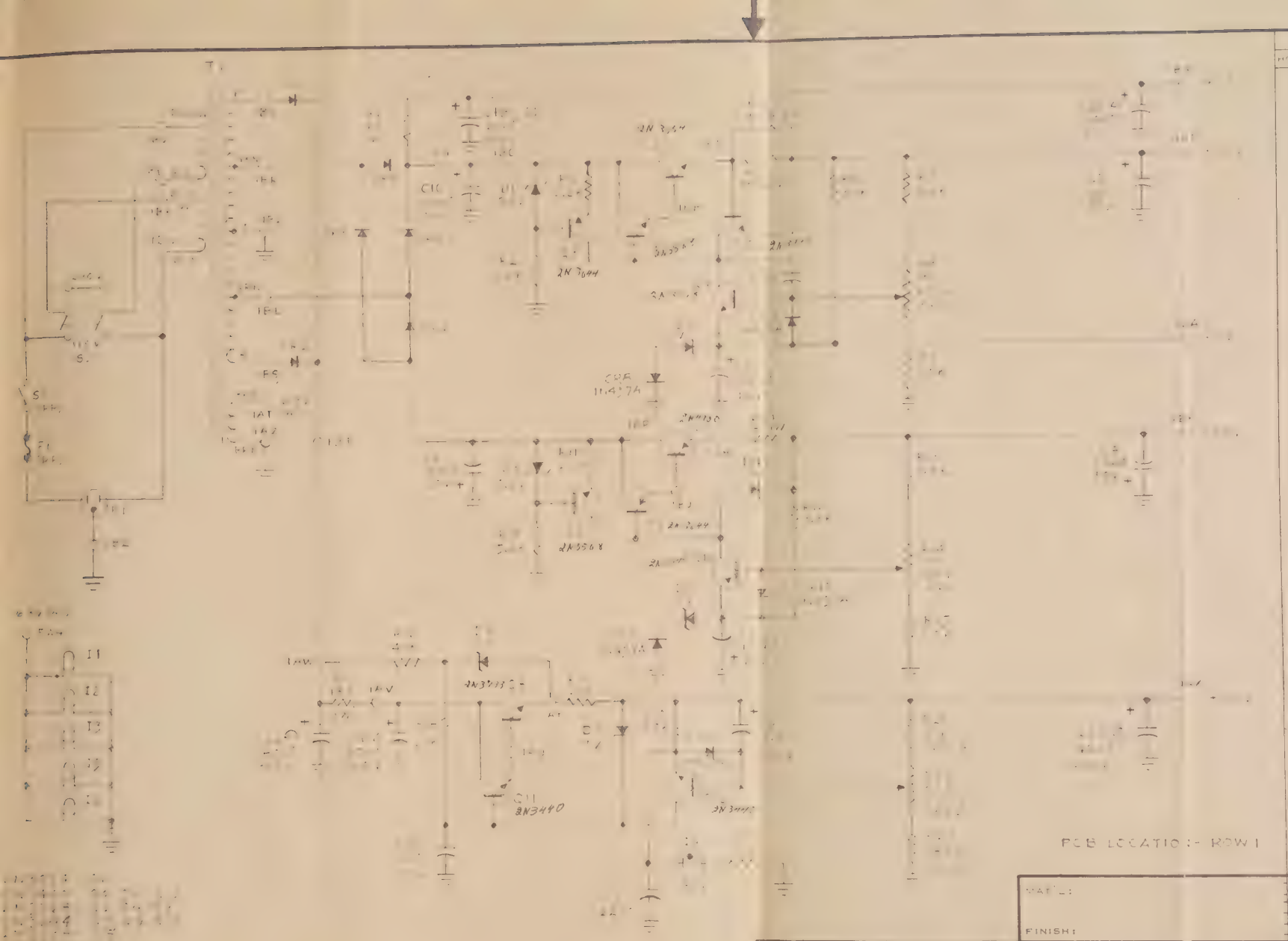
SCALE | DRAWN | TITLE

SHEET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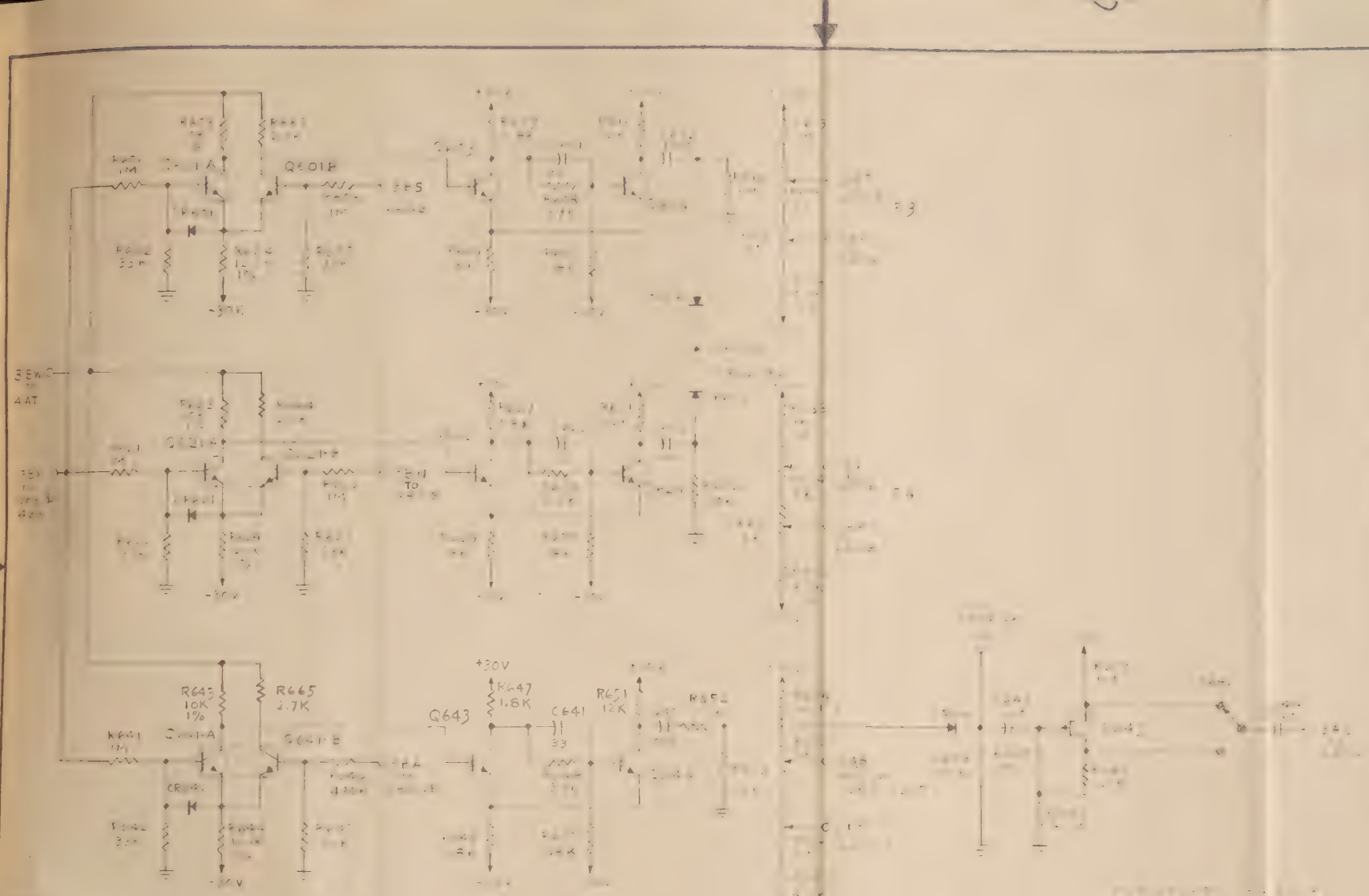


CR601, 602, 621, 622, 641, 642 - IN457A

Q 601, 621, 641 - TD101
Q 603, 604, 623, 624, 643, 644 - 2N3568
Q 645 - 2N4360

ALL RESISTORS TO BE IN OHMS, ½ W,
ALL CAPACITORS TO BE IN PICOFARADS
ALL INDUCTORS TO BE IN MICROHENRIES UNLESS OTHERWISE SPECIFIED
* - VALUE IS ADJUSTED AT FACTORY

MAT'L:

FINISH:

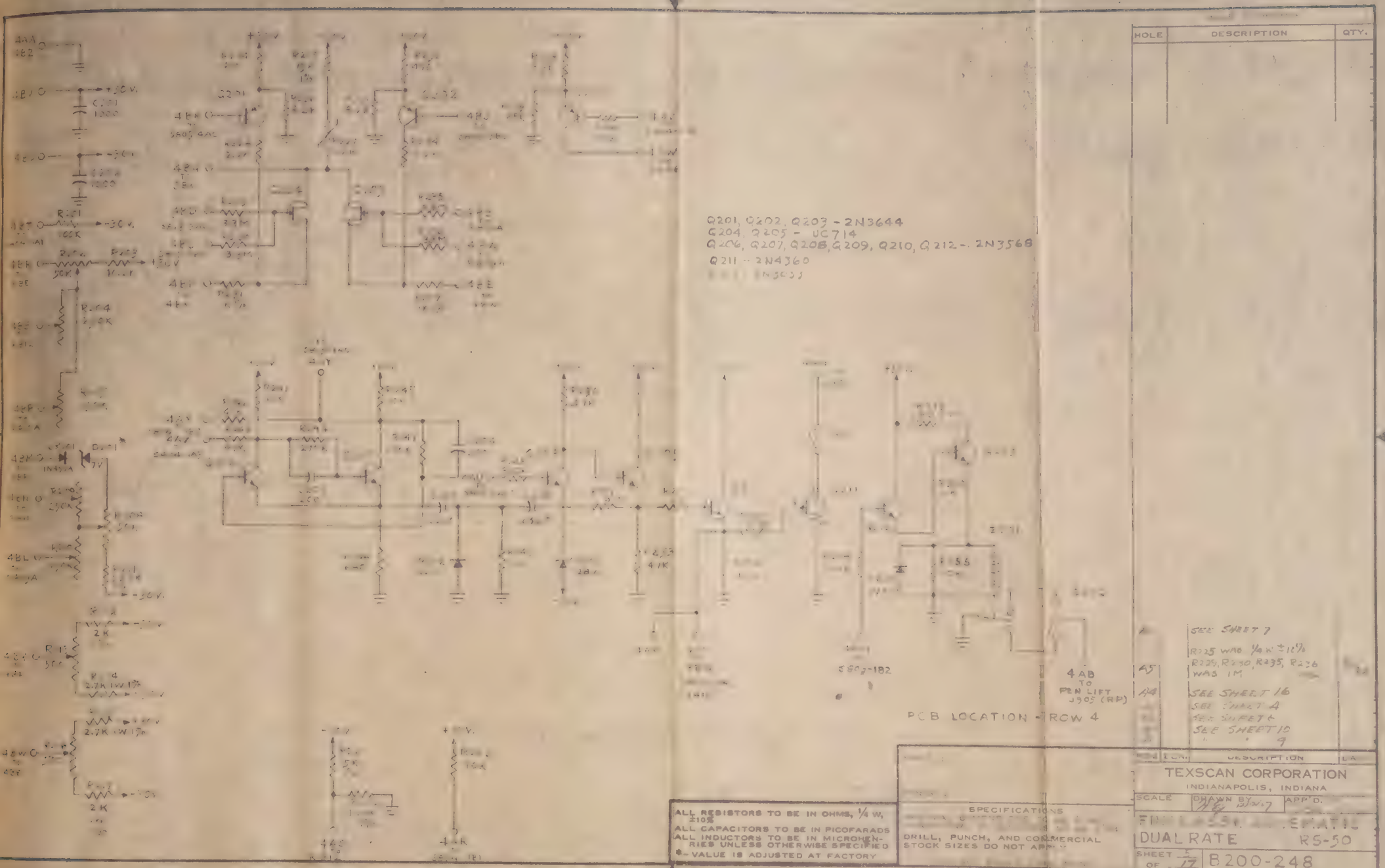
SPECIFICATIONS
DECIMAL DIMENSIONS ±
FRACTIONAL DIMENSIONS TO BE ±1/64
DRILL, PUNCH, AND COMMERCIAL STOCK SIZES DO NOT APPLY

DO NOT SCALE THIS PRINT

REV.	ECN.	DESCRIPTION	DATE

TEXSCAN CORPORATION
INDIANAPOLIS, INDIANA

SCALE	DRAWN BY	APP'D. BY



HOLE	DESCRIPTION	QTY.

A5	SEE SHEET 7 R225 WAS 1/8 W ±1% R229, R230, R235, R236 WAS 1M	
A4	SEE SHEET 16	
	SEE SHEET 4	
	SEE SHEET 10	
	9	

REV.	DESCRIPTION	DATE

ALL RESISTORS TO BE IN OHMS, 1/4 W, ±10%
ALL CAPACITORS TO BE IN PICOFARADS
ALL INDUCTORS TO BE IN MICROHENRIES UNLESS OTHERWISE SPECIFIED
*- VALUE IS ADJUSTED AT FACTORY

SPECIFICATIONS

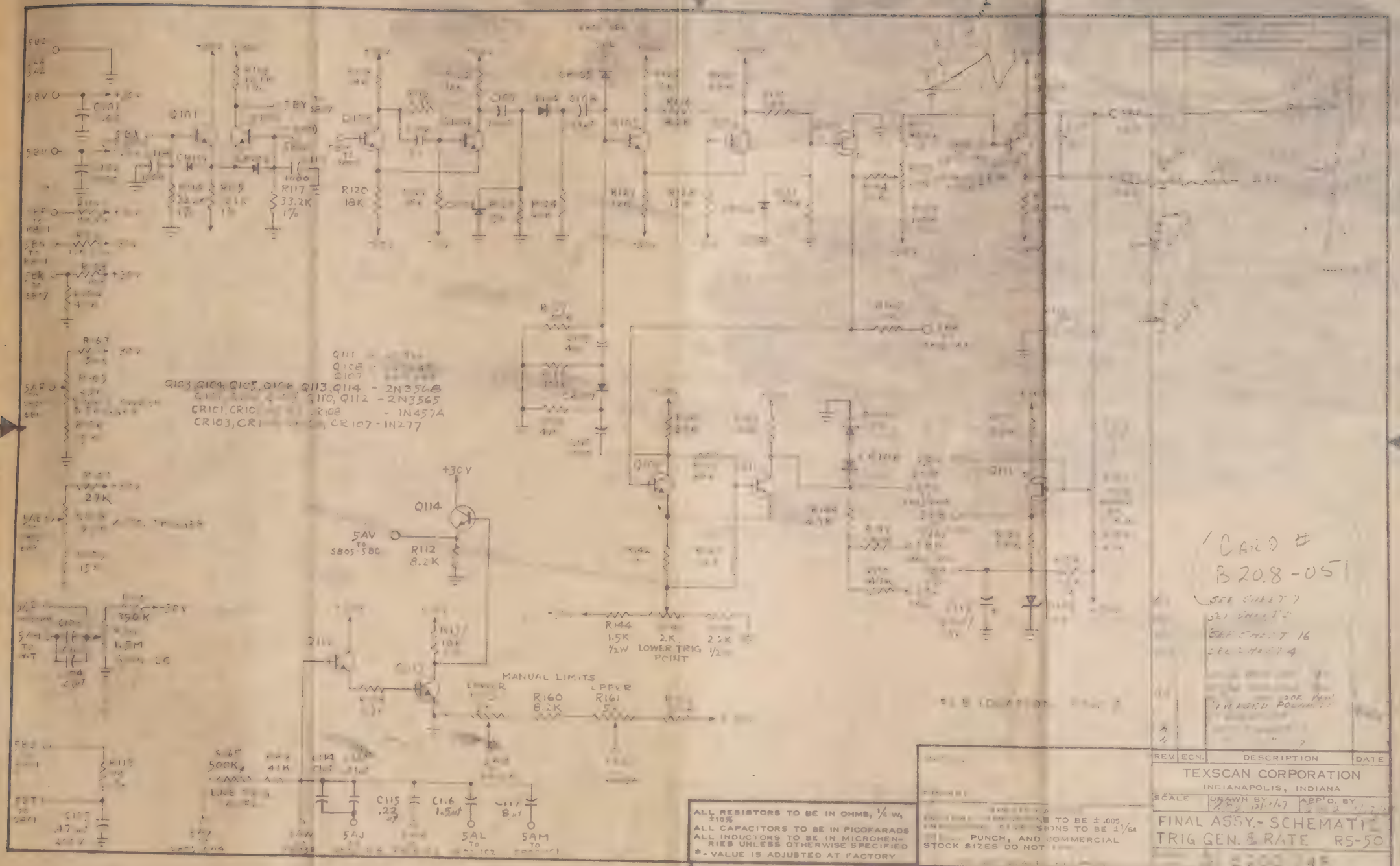
DRILL, PUNCH, AND COMMERCIAL STOCK SIZES DO NOT APP...

TEXSCAN CORPORATION
INDIANAPOLIS, INDIANA

SCALE	DRAWN BY	APP'D.
	JW	

FINAL SCHEMATIC
DUAL RATE RS-50

SHEET 5 OF 17 B200-248



CAID # B20.8-051

ALL RESISTORS TO BE IN OHMS, ¼ W, ±10%
ALL CAPACITORS TO BE IN PICOFARADS
ALL INDUCTORS TO BE IN MICROHENRIES UNLESS OTHERWISE SPECIFIED
*- VALUE IS ADJUSTED AT FACTORY

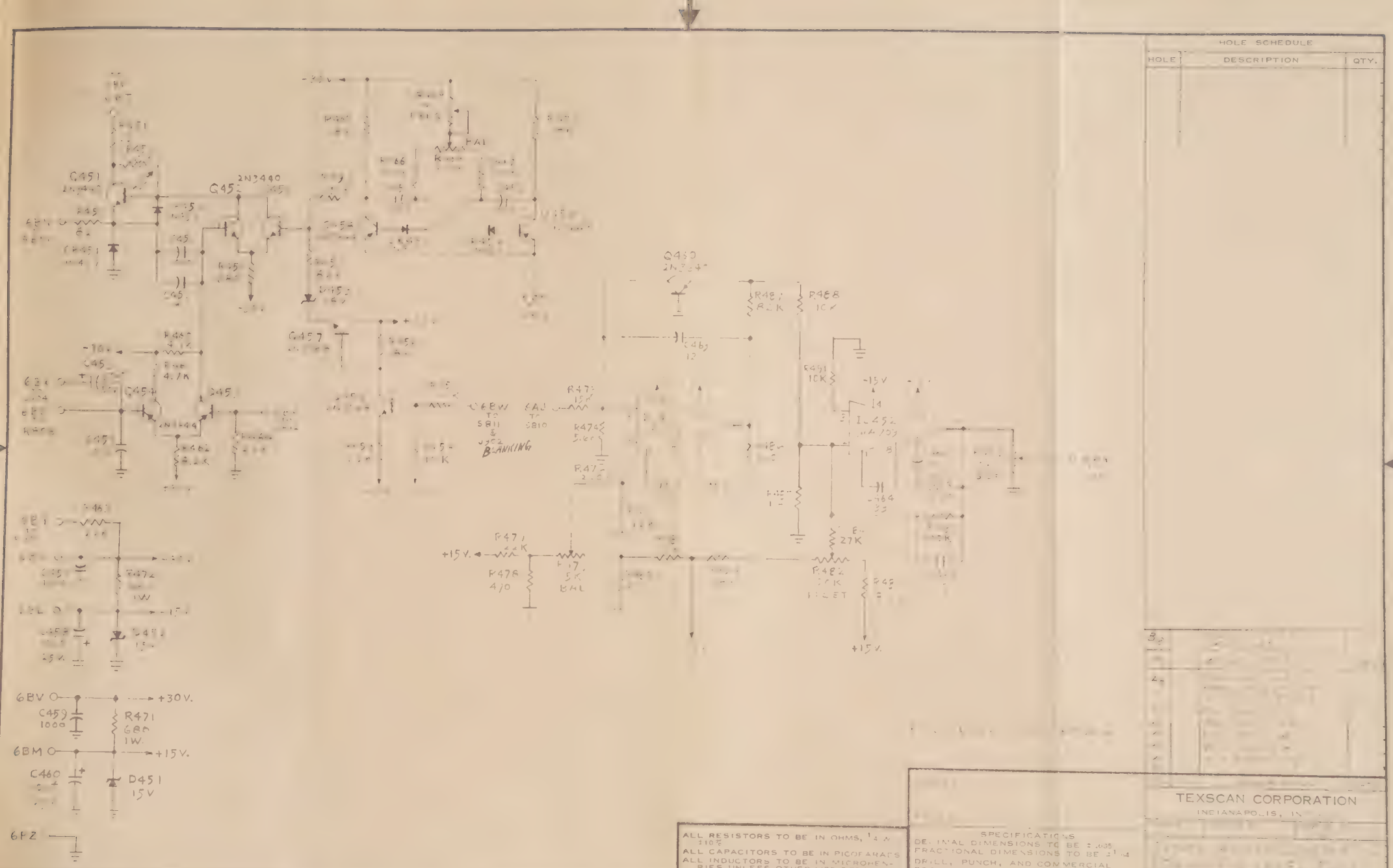
REV	ECN.	DESCRIPTION	DATE

TEXSCAN CORPORATION
INDIANAPOLIS, INDIANA

SCALE	DRAWN BY	APP'D. BY

FINAL ASSY.- SCHEMATIC
TRIG GEN. & RATE RS-50

Row-5


HOLE SCHEDULE
HOLE
DESCRIPTION
QTY.
Q451
2N3440
Q452
2N3440
Q453
2N3440
Q454
2N3440
Q455
2N3440
Q456
2N3440
Q457
2N3440
Q458
2N3440
Q459
2N3440
Q460
2N3440
R451
R452
R453
R454
R455
R456
R457
R458
R459
R460
R461
R462
R463
R464
R465
R466
R467
R468
R469
R470
R471
R472
R473
R474
R475
R476
R477
R478
R479
R480
R481
R482
R483
C451
C452
C453
C454
C455
C456
C457
C458
C459
C460
C461
C462
C463
C464
D451
D452
D453
D454
D455
D456
D457
D458
D459
D460
D461
D462
D463
D464
D465
D466
D467
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D469
D470
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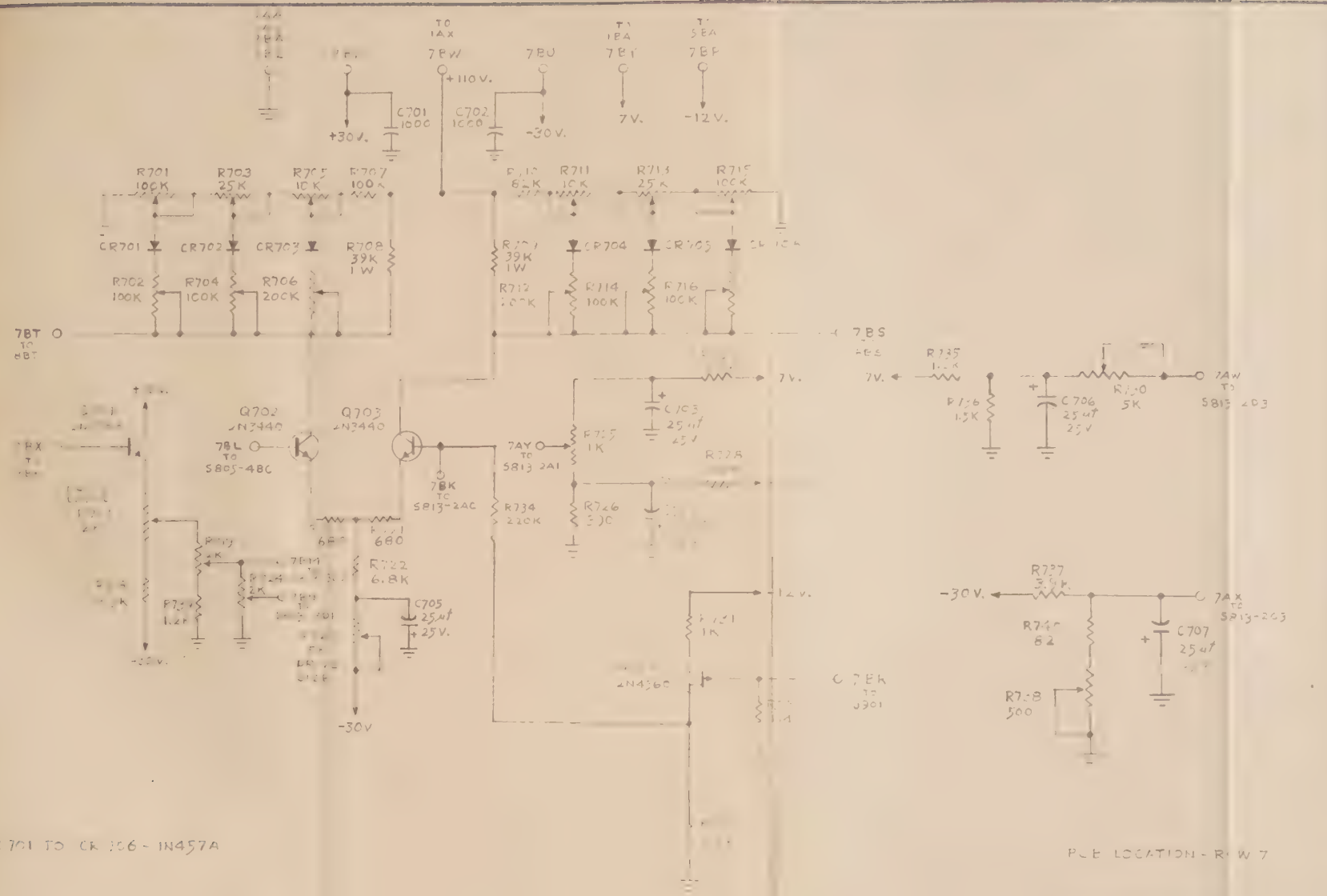
D489
D490



CR 701 TO CR 706 - 1N457A

PCB LOCATION - R-W 7

HOLE SCHEDULE

HOLE	DESCRIPTION	QTY.

A6	SEE SHEET 1	
5	SEE SHEET 1	
A4	SEE SHEET 16	
A7	SEE SHEET 16	

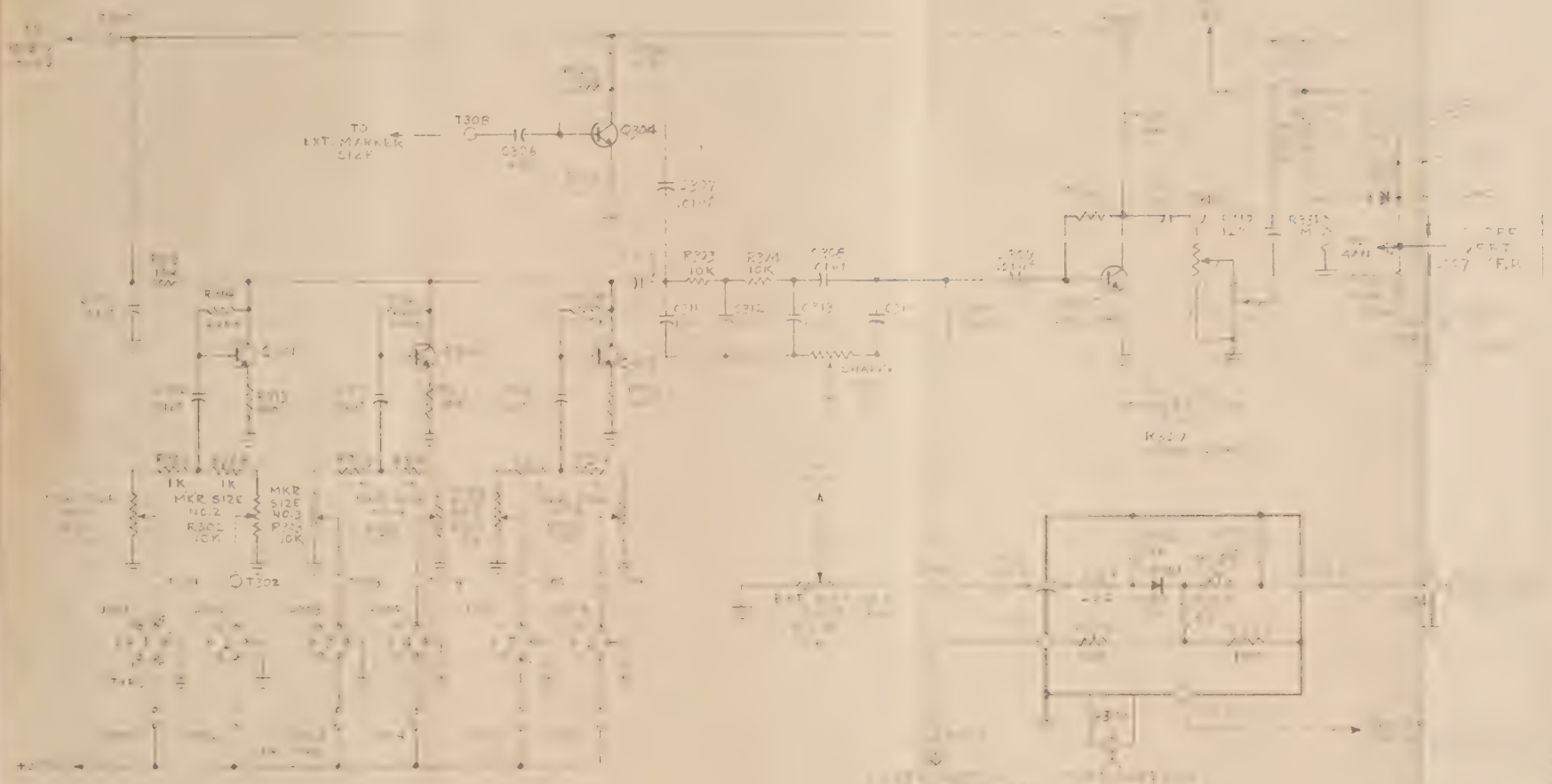
ALL RESISTORS TO BE IN OHMS, 1/4 W, ±10%
ALL CAPACITORS TO BE IN PICOFARADS
ALL INDUCTORS TO BE IN MICROHENRIES UNLESS OTHERWISE SPECIFIED
*-VALUE IS ADJUSTED AT FACTORY

SPECIFICATIONS
DECIMAL DIMENSIONS TO BE ± .005
FRACTIONAL DIMENSIONS TO BE ± 1/64
DRILL, PUNCH, AND COMMERCIAL STOCK SIZES DO NOT APPLY
DO NOT SCALE THIS PRINT

TEXSCAN CORPORATION
INDIANAPOLIS, INDIANA

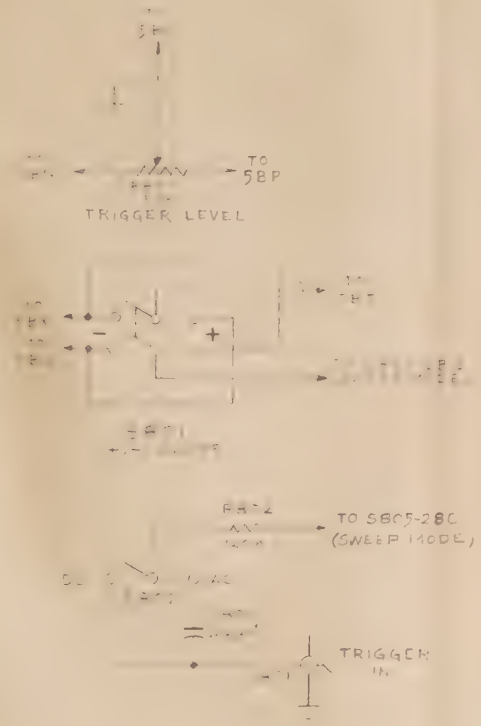
SCALE	DRAWN BY	APP'D.

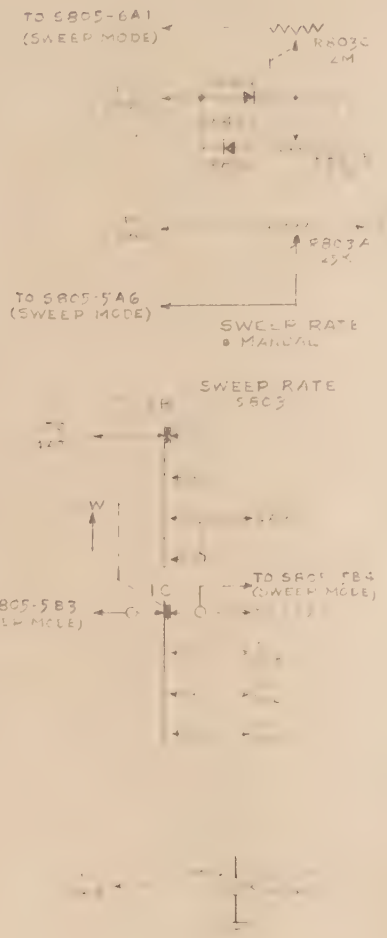
FINAL ASSY - SCHEM.
LINEARITY

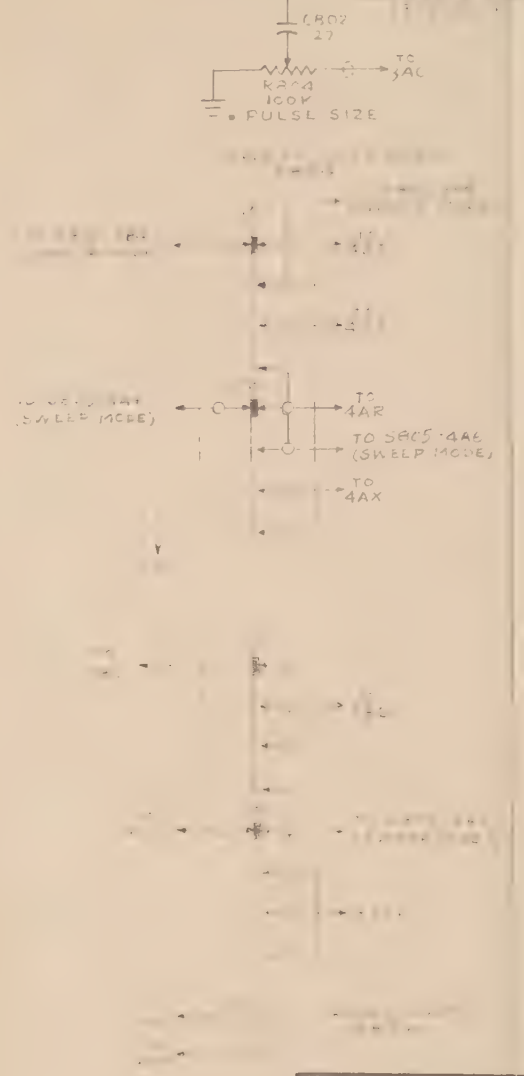


Q301 TO Q304 - 2N3565

ALL RESISTORS TO BE IN OHMS, ¼ W, ±10%
ALL CAPACITORS TO BE IN PICOFARADS
ALL INDUCTORS TO BE IN MICROHENRIES UNLESS OTHERWISE SPECIFIED
*- VALUE IS ADJUSTED AT FACTORY







HOLE SCHEDULE		
SYM.	DESCRIPTION	QTY.

ALL RESISTORS TO BE IN OHMS, 1/4 W, ±10%
ALL CAPACITORS TO BE IN PICOFARADS
ALL INDUCTORS TO BE IN MICROHENRIES UNLESS OTHERWISE SPECIFIED
* - VALUE IS ADJUSTED AT FACTORY

MAT'L:

FINISH:

SPECIFICATIONS
DECIMAL DIMENSIONS TO BE ±.005
FRACTIONAL DIMENSIONS TO BE ±1/64
DRILL, PUNCH, AND COMMERCIAL STOCK SIZES DO NOT APPLY

DO NOT SCALE THIS PRINT

REV.	LTR.	DESCRIPTION	DATE

TEXSCAN CORPORATION
INDIANAPOLIS, INDIANA

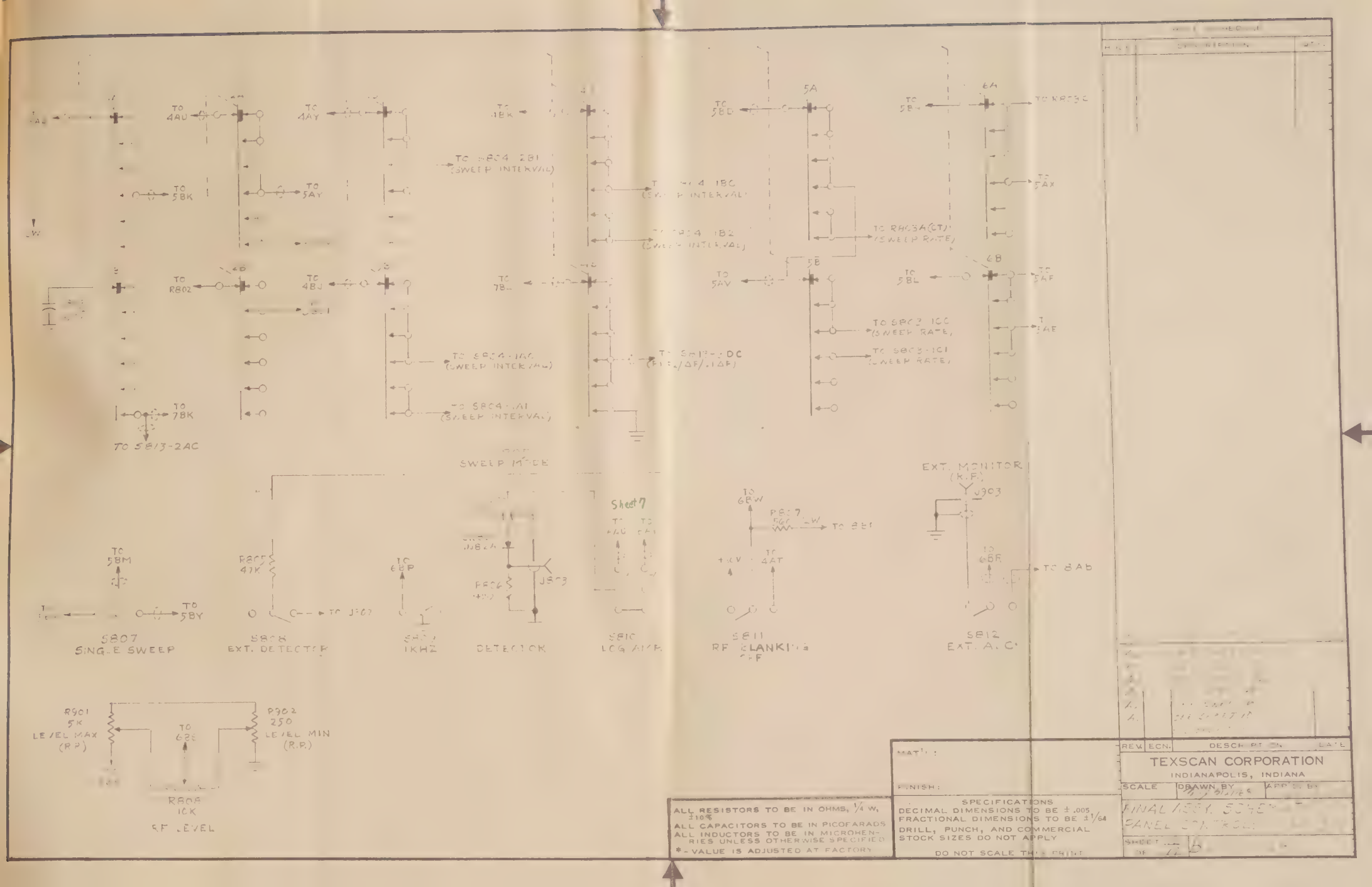
SCALE	DRAWN BY	APP'D. BY

FINAL ASSY. SCHEMATIC
PANEL CONTROLS

SHEET

Placeholder

Placeholder



REV.	ECN.	DESCRIPTION	DATE

MAT'L :

FINISH :

ALL RESISTORS TO BE IN OHMS, ¼ W, ±10%
ALL CAPACITORS TO BE IN PICOFARADS
ALL INDUCTORS TO BE IN MICROHENRIES UNLESS OTHERWISE SPECIFIED
* - VALUE IS ADJUSTED AT FACTORY

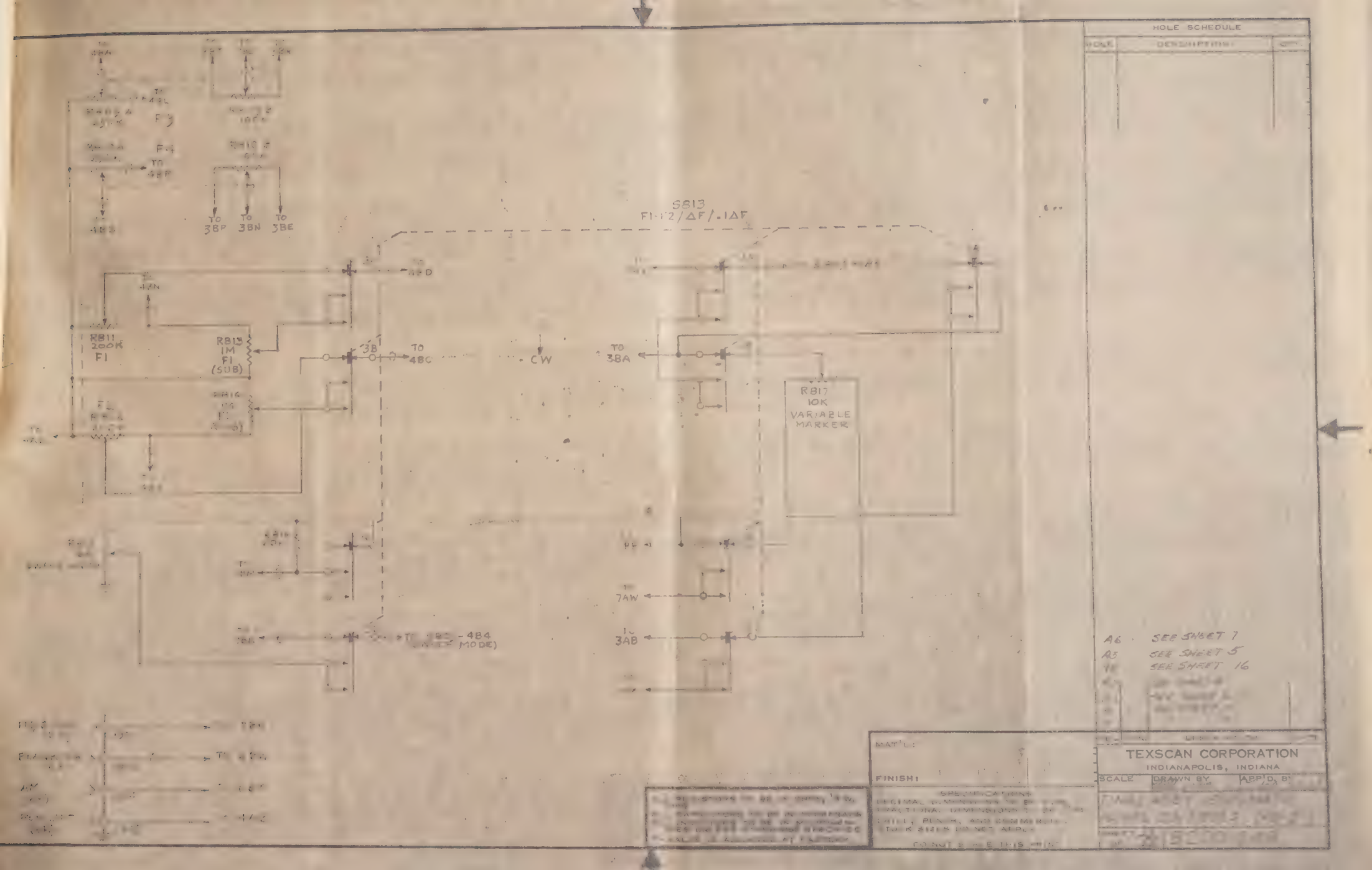
SPECIFICATIONS
DECIMAL DIMENSIONS TO BE ± .005
FRACTIONAL DIMENSIONS TO BE ± 1/64
DRILL, PUNCH, AND COMMERCIAL STOCK SIZES DO NOT APPLY
DO NOT SCALE THIS PRINT

TEXSCAN CORPORATION
INDIANAPOLIS, INDIANA

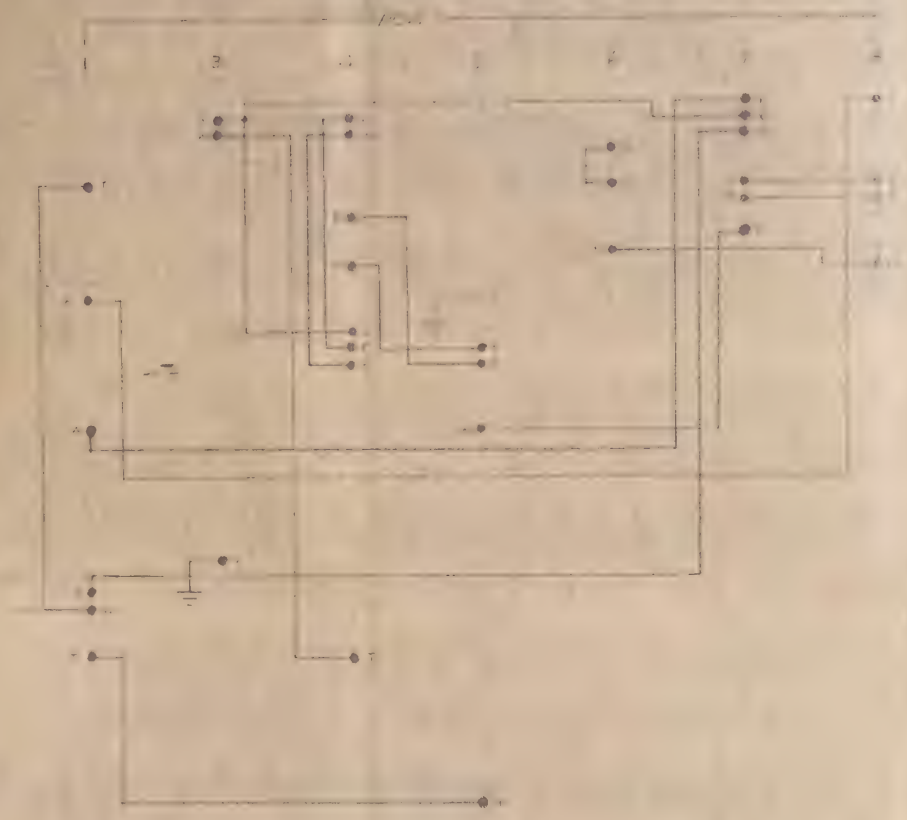
SCALE	DRAWN BY	APP'D BY

FINAL TEST PANEL CONTROL

SHEET 12 OF 12


HOLE SCHEDULE
HOLE
DESCRIPTION
S813
F1-F2/ΔF/.1ΔF
RB11
200K
F1
RB13
1M
F1
(SUB)
RB16
RB17
10K
VARIABLE
MARKER
3B
CW
TO
4BC
TO
3BA
TO
3BP
TO
3BN
TO
3BE
TO
4BD
TO
4BS
TO
4BL
TO
4BP
TO
74W
TO
3AB
TO
4B4
(MODE)
A6 SEE SHEET 7
A3 SEE SHEET 5
16 SEE SHEET 16
MAT'L:
FINISH:
SPECIFICATIONS
DECIMAL DIMENSIONS TO BE ±.005
FRACTIONAL DIMENSIONS TO BE ±1/64
DRILL, PUNCH, AND COUNTERSINK
TOOK SIZES DO NOT APPLY
DO NOT SCALE THIS PRINT
TEXSCAN CORPORATION
INDIANAPOLIS, INDIANA
SCALE
DRAWN BY
APP'D BY

ALL 4 JUMPERS NOT INCLUDED ON SHEETS 2 THRU 13
A1 & SHEET 5



HOLE SCHEDULE

HOLE	DESCRIPTION

REV	ECN.	DESCRIPTION	DATE
A1		SEE SHEET 1	

MAT'L:

FINISH:

SPECIFICATIONS
DECIMAL DIMENSIONS TO BE ± .005
FRACTIONAL DIMENSIONS TO BE ± 1/64
DRILL, PUNCH, AND COMMERCIAL STOCK SIZES DO NOT A[illegible]

DO NOT SCALE THIS PRINT

ALL RESISTORS TO BE IN OHMS, 1/4 W, ±10%
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*- VALUE IS ADJUSTED AT FACTORY

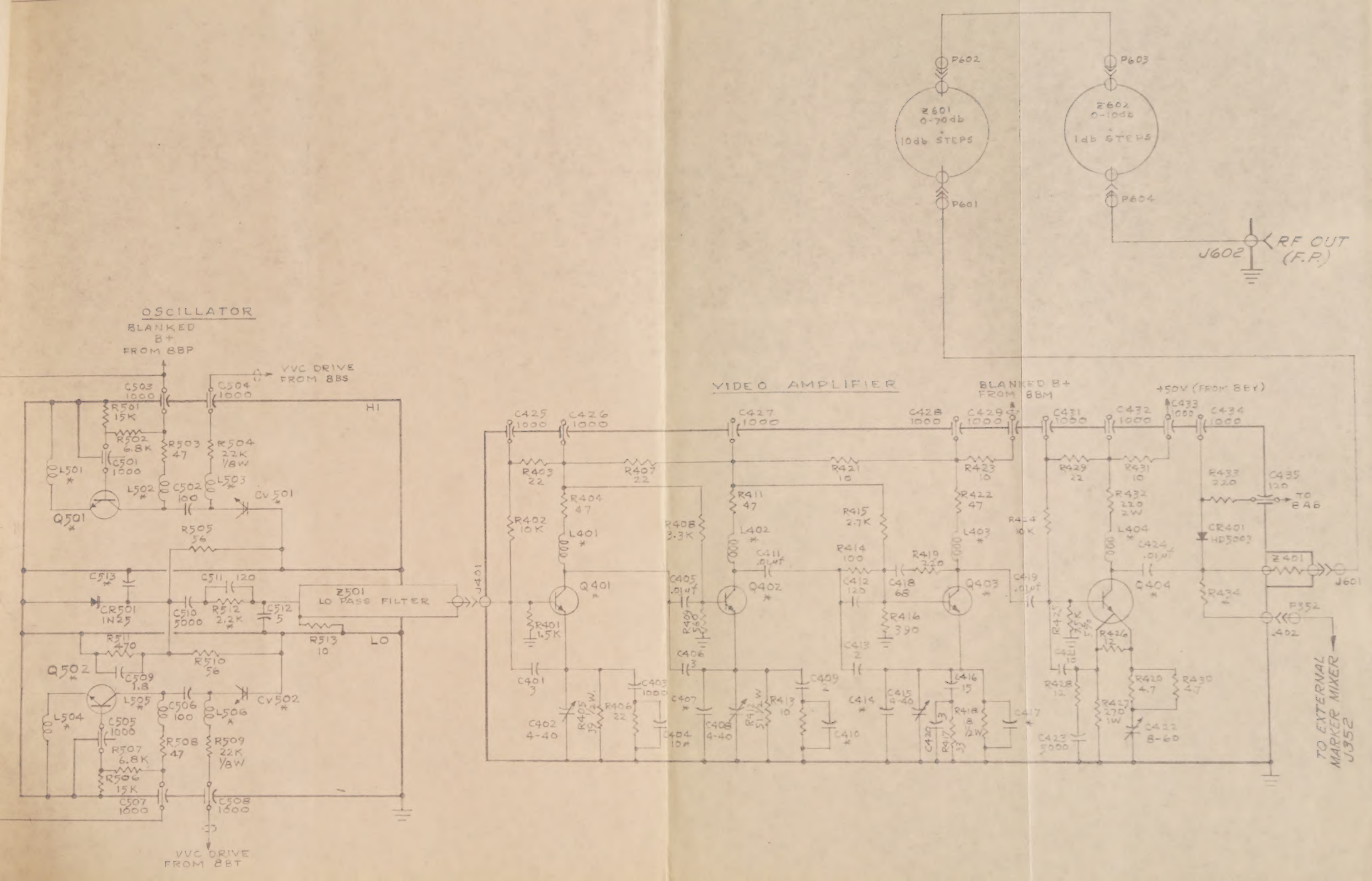
TEXSCAN CORPORATION
INDIANAPOLIS, INDIANA

SCALE	DRAWN BY	APP'D. BY
—	[illegible] 3/16/68	[illegible] 3/19/68

FINAL ASSY-SCHEMATIC
JUMPERS RS-50

SHEET 12 OF 12

B200-248


OSCILLATOR
BLANKED B+ FROM 8BP
VVC DRIVE FROM 8BS
VVC DRIVE FROM 8BT
C503 1000
C504 1000
R501 15K
R502 6.8K
R503 47
R504 22K 1/8W
C501 1000
L501 *
L502 *
L503 *
C502 100
CV501
Q501 *
R505 56
C513
C511 120
CR501 IN25
C510 5000
R512 2.2K *
C512 5
Z501 LO PASS FILTER
R513 10
LO
J401
R511 470
R510 56
Q502 *
C509 1.8
L505 *
L504 *
C505 1000
C506 100
L506 *
CV502 *
R507 6.8K
R508 47
R509 22K 1/8W
R506 15K
C507 1000
C508 1000
H1
P602
P603
Z601 0-70db 10db STEPS
Z602 0-10db 1db STEPS
P601
P604
J602
RF OUT (F.P.)
VIDEO AMPLIFIER
BLANKED B+ FROM 8BM
+50V (FROM 8BY)
C425 1000
C426 1000
C427 1000
C428 1000
C429 1000
C431 1000
C432 1000
C433 1000
C434 1000
R403 22
R407 22
R421 10
R423 10
R429 22
R431 10
R433 220
C435 120
TO EA6
R404 47
L401 *
R402 10K
R408 3.3K
R411 47
L402 *
R415 2.7K
R422 47
L403 *
R414 10K
R432 220 2W
L404 *
CR401 HD5003
C411 .01μf
R414 100
R419 220
C424 .01μf
Z401
J601
C405 .01μf
Q401 *
Q402 *
Q403 *
Q404 *
C418 68
C419 .01μf
R412 120
R416 390
R401 1.5K
R409 56
R434 *
R352
J402
C406 3
C413 2
C401 3
C402 4-40
R405 39 1/2W.
R406 22
C403 1000
C404 10*
C407 *
C408 4-40
R413 10
C409 *
C410 *
C414 *
C415 4-40
C416 15
R418 18 1/2W
C417
C420 3
R417 33
R428 12
C421 15
C423 5000
R426 2
R427 270 1W
C422 8-60
R420 4.7
R430 4.7
TO EXTERNAL MARKER MIXER J352

CERTIFICATION

Texscan Corporation certifies that this instrument has been thoroughly tested, inspected, and found to be in compliance with its published specifications.